



DATE: June 17, 2019

TO: John Kuba, ConnectGen, LLC

FROM: Karl Kosciuch, WEST, Inc.

RE: 2019 Golden Eagle and Raptor Nest Survey Report, Rail Tie, WY

Introduction

ConnectGen, LLC (ConnectGen) is developing the proposed Rail Tie Wind Project (Rail Tie, Project) in Albany County, Wyoming. Western Ecosystems Technology, Inc. (WEST) is under contract to provide biological support for the development of the Project, including aerial surveys for golden eagle (*Aquila chrysaetos*) and non-eagle raptor nests within the Project area and a surrounding 10-mile (mi; 16 kilometer [km]) buffer for eagles (Survey Area), and 1-mi (1.6 km) buffer for non-eagle raptors. Aerial surveys began in mid-March, 2019; a second visit was completed in early May, 2019. This memorandum summarizes the methodology and results of the 2019 golden eagle and raptor nest surveys at Rail Tie.

Survey Area

The Survey Area included the Project area and a surrounding 10-mi buffer, including portions of Albany and Laramie counties, Wyoming and Larimer County, Colorado (Figure 1). This area is bounded by the Laramie Mountains to the east and the Arapaho Roosevelt National Forest to the south. The Survey Area consists primarily of grassland and lodgepole/ponderosa pine habitat. The Survey Area included a number of rock outcroppings or mountains with large cliffs, all of which offer potentially suitable nesting habitat for golden eagles and other raptors. Much of the Survey Area is privately owned and actively managed for livestock grazing; non-private lands of the Arapaho Roosevelt National Forest, the Pole Mountain area of the Medicine Bow National Forest, and Hutton Lake National Wildlife Refuge.

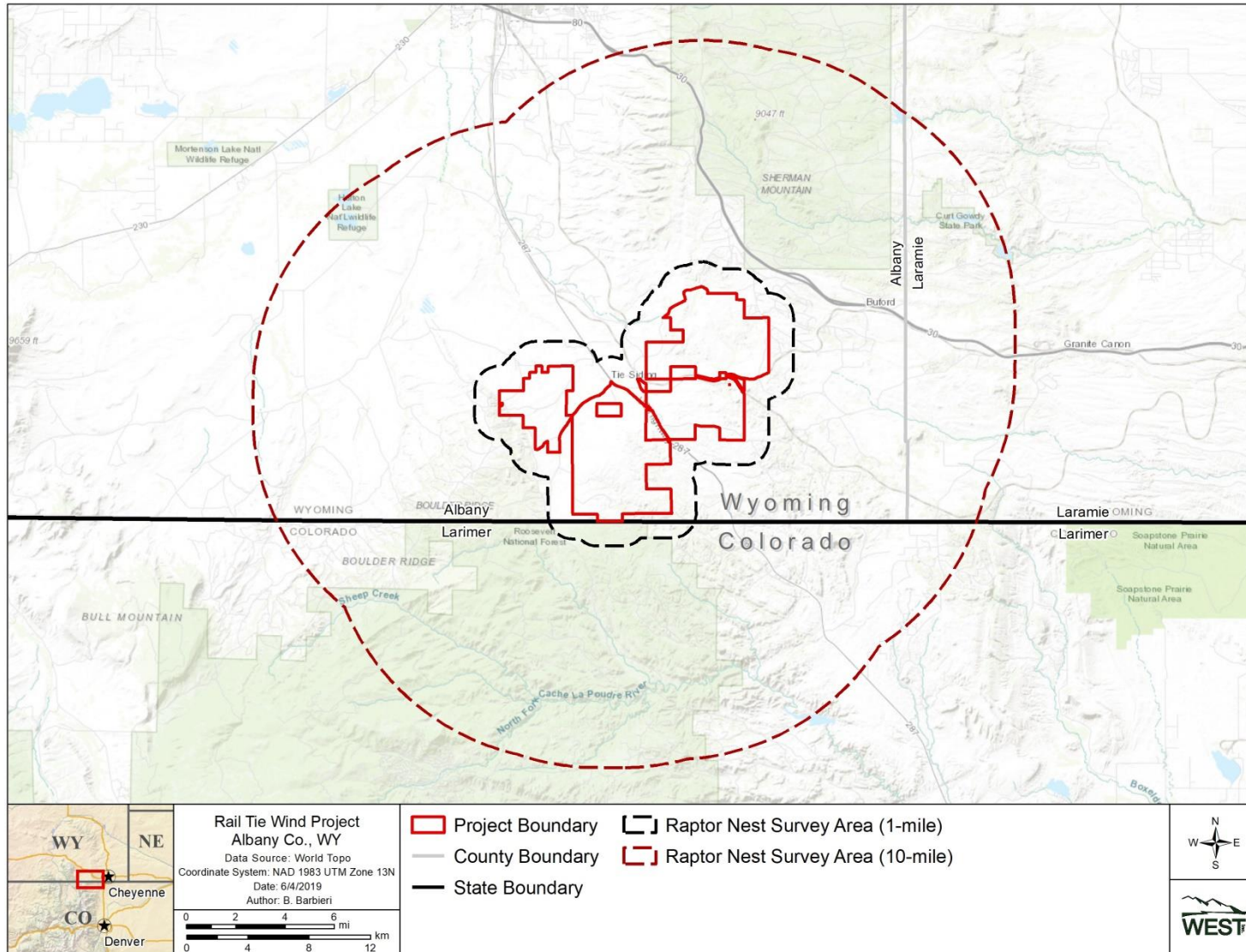


Figure 1. Overview of 2019 Rail Tie Wind Project golden eagle and non-eagle raptor nest Survey Area including 1-mile and 10-mile buffers.

Methods

The U.S. Fish and Wildlife Service (USFWS) recommends conducting two rounds of double-observer (i.e., a primary and secondary observer) aerial nest surveys at a proposed wind energy facility at least 30 days apart (USFWS 2013), with the initial survey scheduled to coincide with the primary nest establishment time period for golden eagles in a particular region. Nesting chronology of golden eagles varies depending on region (e.g., latitude) and yearly site-specific seasonality (e.g., winter storm activity); in Wyoming, golden eagles may begin to establish territories as early as January and February with nest-building, egg-laying, and requisite incubation activity commencing thereafter (e.g., March into April; Pagel et al. 2010). The initial survey was conducted on 11 and 12 March, 2019 during a time period that overlapped the primary territory establishment period of golden eagles in the area, while the follow-up survey was performed on 10 May, 2019 when both resident and non-resident (i.e., migratory) raptor species were actively engaged in reproductive activities (e.g., nest building, incubating, brooding), and when golden eagles engaged in ongoing nesting activities would be reliably on or around nests. The initial effort was also timed to minimize disturbance to golden eagles on active nests prior to critical life history stages such as incubating and brooding; golden eagles observed in the Survey Area were establishing territories and building nests in early March.

The Survey Area was determined based on a Project boundary provided by ConnectGen, with 1-mi and 10-mi Project buffers established in a Geographic Information System (GIS). The focus of the surveys was to record nests that may be used by raptors, including potential eagle and other raptor nests within the Project area and 1-mi buffer and potential eagle nests within the 10-mi buffer. If non-eagle raptor nests were detected incidentally while searching for eagle nests within the 10-mile buffer, they were recorded to facilitate an accurate count of raptor nests for use during follow up surveys and to document nests that could potentially be used by eagles or built up by eagles. The survey utilized an intuitive controlled survey method during the first survey (Figure 2). This intuitive controlled survey focused on areas with the highest potential to support target species; in this case, golden eagles and other raptors. These key habitat features included cliffs, rock outcrops, and large trees. The second survey focused on nest checks and searches of suitable habitat (Figure 3). The focus of the 10-mi Project buffer nest search was on eagles

During surveys, the helicopter was positioned to allow thorough visual inspection of all appropriate habitat features. In general, the helicopter remained within a zone 100-feet (ft; 30.5 m) to 500-ft (152.4 m) above ground level at a relative air speed of approximately 50 miles per hour (mph; 80.5 kilometers per hour [kph]). When nests were located, the helicopter reduced speed and adjusted flight track to allow for a clear view of the nest for documentation and photographing. For each nest found, a GPS location was recorded, a photograph was taken, and nest attribute data were collected (Table 1). If there were multiple nests at a location, one representative GPS point was recorded and the number of nests at the location was noted. Photos of eagle nests are contained in Appendix A. If no birds were associated with a nest it is classified as unknown species. Unknown species nests are further classified as 'raptor' if the nest was likely built by a raptor species and 'large stick nest' if the size and structure are characteristic of an eagle.

Nest status was categorized using definitions originally proposed by Postupalsky (1974) and largely followed today (ECPG 2013). Nests were classified as occupied if any of the following were observed at the nest structure: (1) an adult in an incubating position; (2) eggs; (3) nestlings or fledglings; (4) presence of an adult (sometimes sub-adults); (5) a newly constructed or refurbished stick nest in the area where territorial behavior of a raptor had been observed earlier in the breeding season; or (6) a recently repaired nest with fresh sticks (clean breaks) or fresh boughs on top, and/or droppings and/or molted feathers on its rim or underneath. Occupied nests were further classified as active if an egg or eggs were laid. Nests were classified as inactive if no eggs or chicks were present. Nests not meeting the above criteria for "Occupied" during at least two consecutive surveys were classified as "Unoccupied."

Results

Twelve golden eagle nests were documented during surveys (Table 1; Figure 4). Of the twelve nest locations, three had multiple nests at a location including nest 35 (five nests), 48 (two nests), and 62 (two nests); however, these are considered a single nest for the purposes of this study. Of the 12 golden eagle nests, the final determination of status was seven occupied-active and five occupied-inactive. Of the seven occupied-active golden eagle nests, four contained adults in an incubating position and the number of eggs could not be determined. One 2-week old chick was observed in each of the three remaining occupied-active nests (nests 10, 34, and 43).

One occupied-active bald eagle nest was documented during surveys (Table 1). The adult was in incubating position and the number of eggs could not be determined.

Other occupied-active nests documented during surveys included one Canada goose, two common raven, three ferruginous hawk, five red-tailed hawk, one Swainson's hawk, one prairie falcon, and five great horned owl (Table 2; Figure 5).

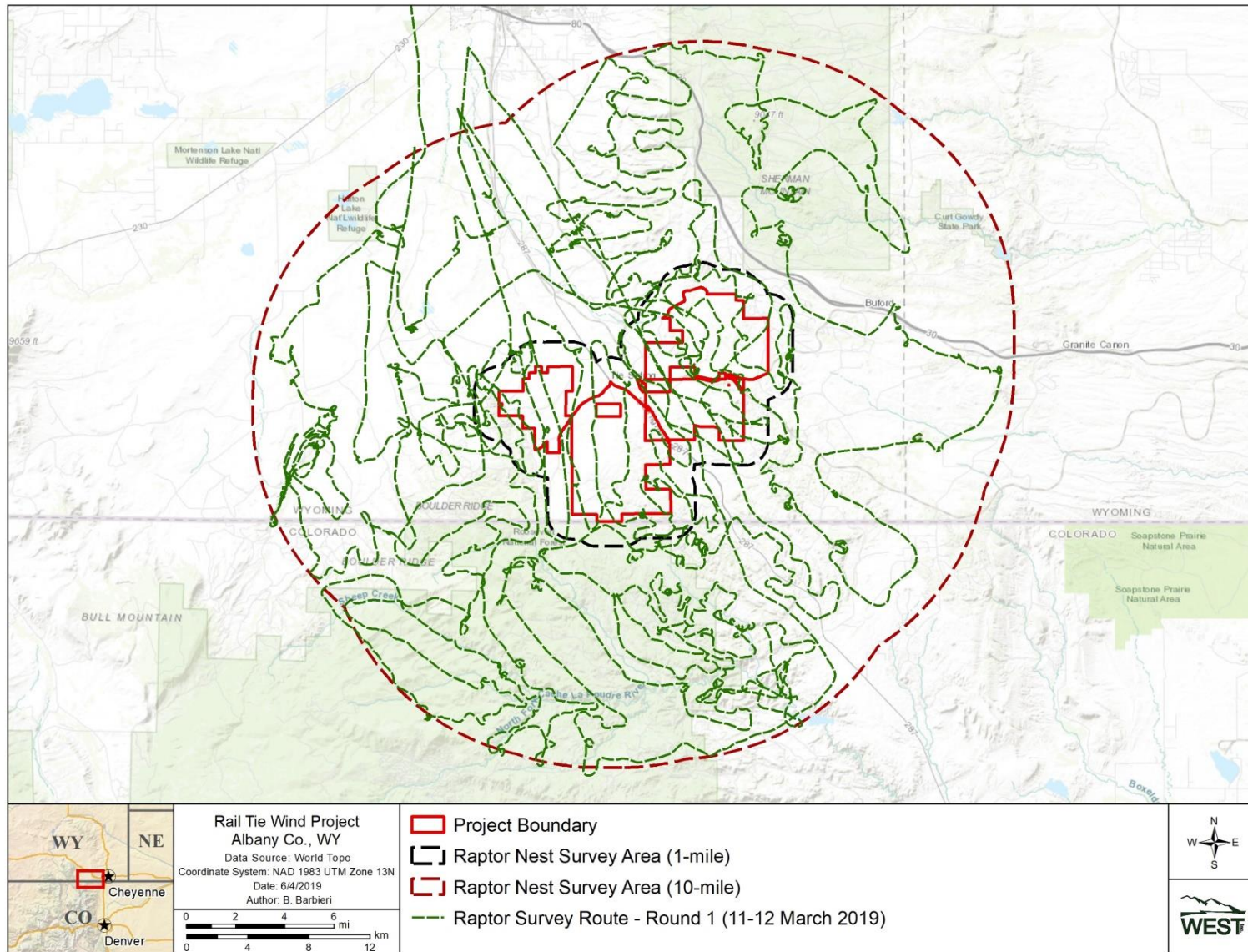


Figure 2. Survey route during round 1 aerial nest surveys at Rail Tie Wind Project, 11 – 12 March 2019.

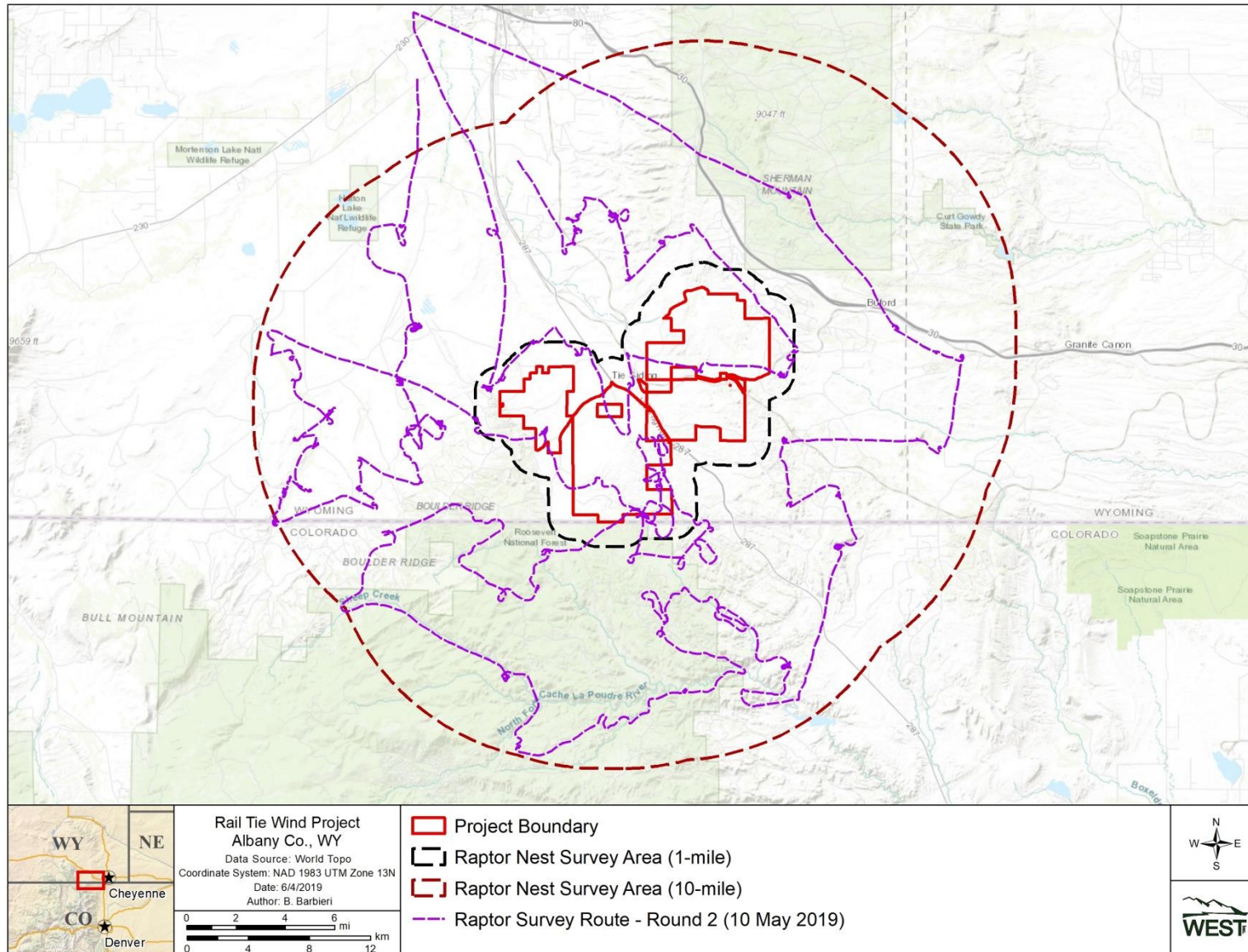


Figure 3. Survey route during round 2 aerial nest surveys at Rail Tie Wind Project, 10 May 2019.

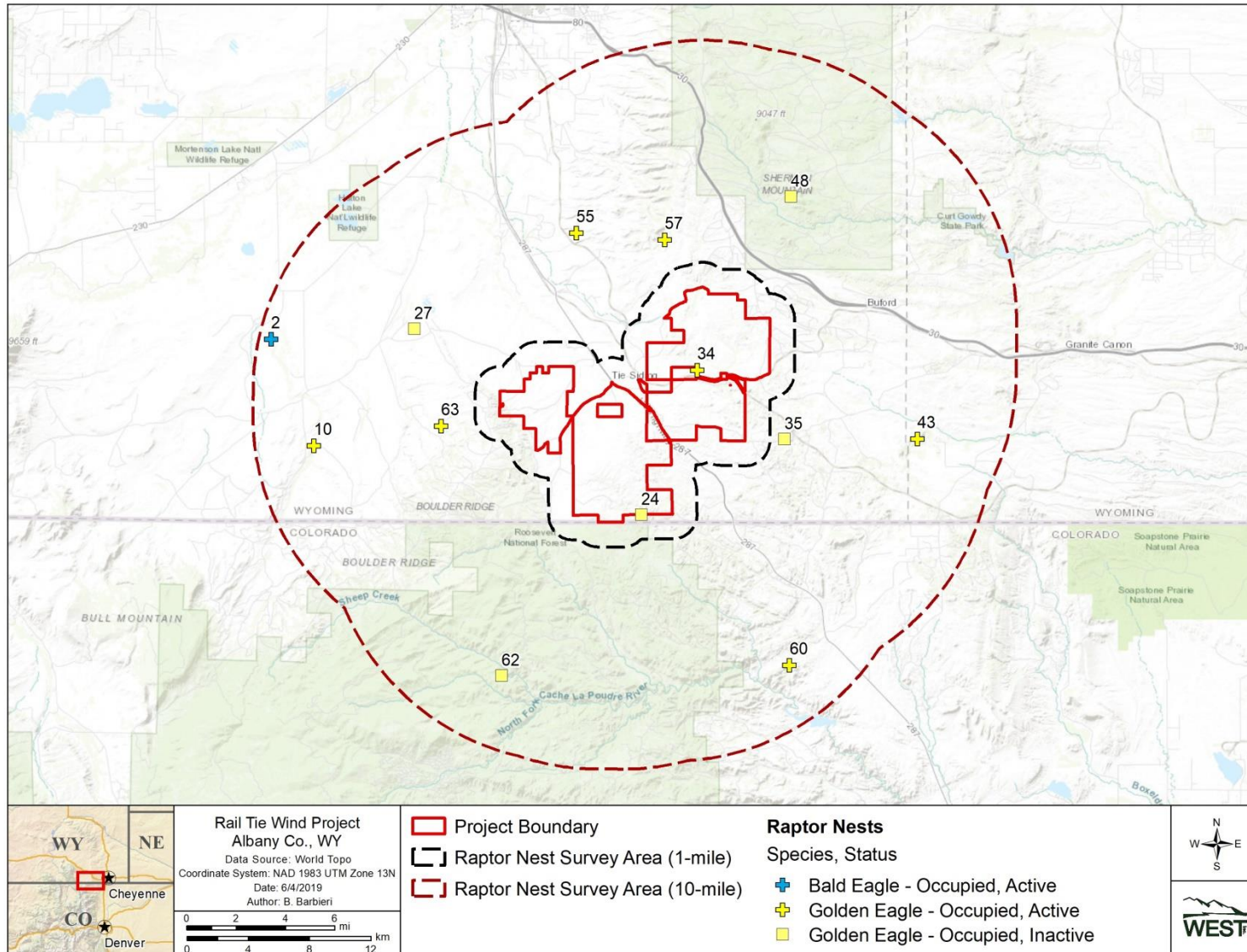


Figure 4. Bald eagle and golden eagle nest locations documented during aerial surveys of Rail Tie, 2019.

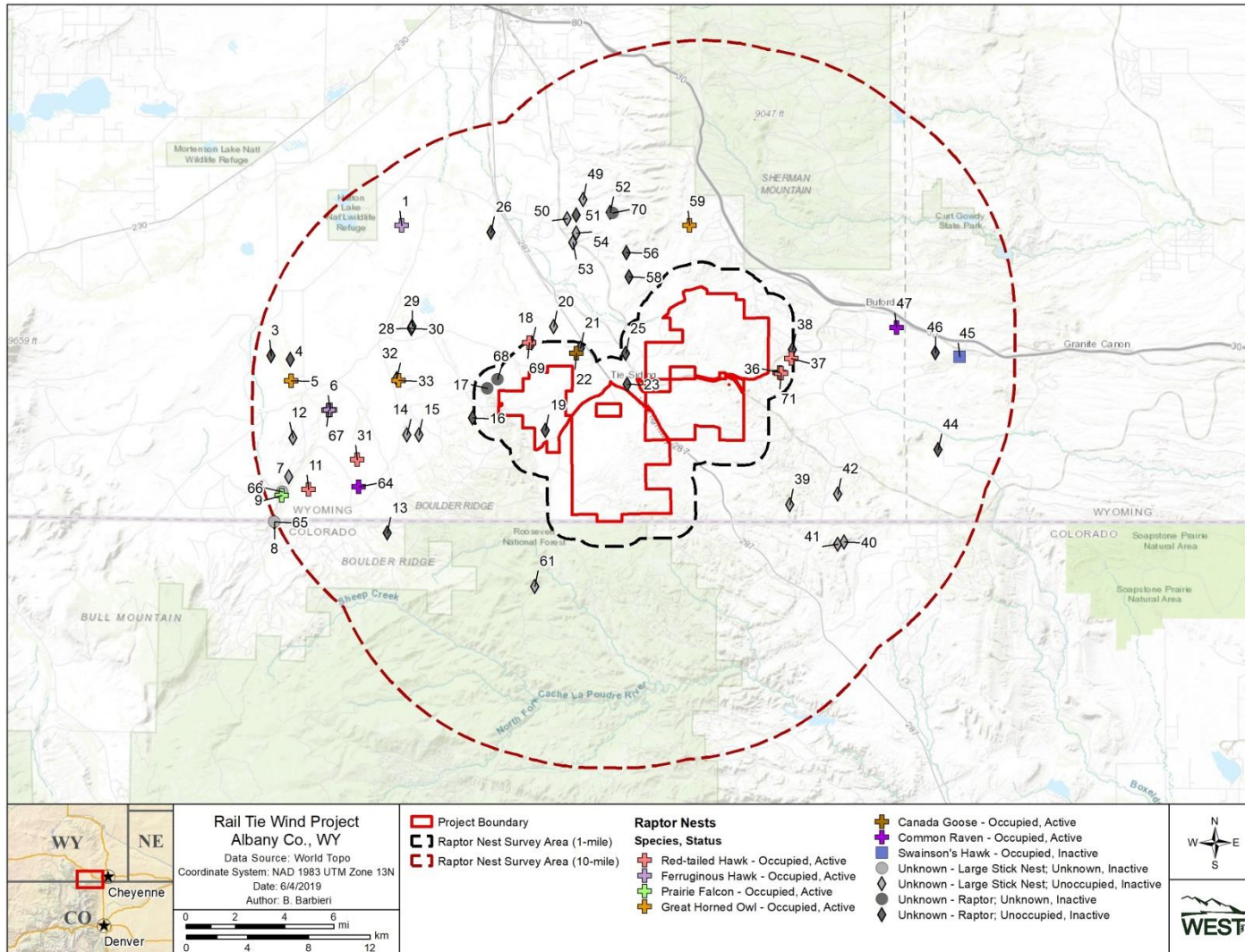


Figure 5. Non-eagle raptor nest locations documented during aerial surveys of Rail Tie.

Table 1. Eagle Nests Detected During Nest Surveys for the Rail Tie Wind Project, Albany County, Wyoming.

Nest ID	Species*	1st Visit	Status	Contents	2nd Visit	Status	Nest Substrate	Location	Contents
2	Bald eagle	3/11/2019	Occupied Active	Incub. Adult	5/10/2019	Occupied Active	Tree	10-mile buffer	Unknown, incubating adult
10	Golden eagle	3/11/2019	Occupied Active	Incub. Adult	5/10/2019	Occupied Active	Cliff	10-mile buffer	1 chick, 2 weeks old
24	Golden eagle	3/11/2019	Occupied Inactive	Empty	5/10/2019	Occupied Inactive	Cliff	1-mile buffer	Empty
27	Golden eagle	3/11/2019	Occupied Inactive	Empty	5/10/2019	Occupied Inactive	Cliff	10-mile buffer	Empty
34	Golden eagle	3/11/2019	Occupied Inactive	Empty	5/10/2019	Occupied Active	Cliff	Project Area	1 chick, 2 weeks old
35	Golden eagle	3/11/2019	Occupied Inactive	Empty	5/10/2019	Occupied Inactive	Cliff	10-mile buffer	Empty
43	Golden eagle	3/11/2019	Occupied Inactive	Empty	5/10/2019	Occupied Active	Cliff	10-mile buffer	1 chick, 2 weeks old
48	Golden eagle	3/11/2019	Occupied Inactive	Empty	5/10/2019	Occupied Inactive	Cliff	10-mile buffer	Empty
55	Golden eagle	3/12/2019	Occupied Inactive	Empty	5/10/2019	Occupied Active	Cliff	10-mile buffer	Unknown, incubating adult
57	Golden eagle	3/12/2019	Occupied Active	Incub. Adult	5/10/2019	Occupied Active	Tree	10-mile buffer	Unknown, incubating adult
60	Golden eagle	3/12/2019	Unoccupied Inactive	Empty	5/10/2019	Occupied Active	Cliff	10-mile buffer	Unknown, incubating adult
62	Golden eagle	3/12/2019	Occupied Inactive	Empty	5/10/2019	Occupied Inactive	Cliff	10-mile buffer	Empty
63	Golden eagle	3/12/2019	Not Detected		5/10/2019	Occupied Active	Cliff	10-mile buffer	Unknown, incubating adult

Table 2. Raptor Nests Detected During Nest Surveys for the Rail Tie Wind Project, Albany County, Wyoming.

Nest ID	Species	1st Visit	Status	Contents	2nd Visit	Status	Nest Substrate	Location	Contents
22	Canada Goose	3/11/2019	Inactive	Empty	5/10/2019	Occupied Active	Tree	1-mile buffer	Unknown, adult incubating
47	Common Raven	3/11/2019	Inactive	Empty	5/10/2019	Occupied Active	Tree	10-mile buffer	Unknown, adult incubating
64	Common Raven	3/11/2019	Not Detected		5/10/2019	Occupied Active	Cliff	10-mile buffer	Unknown, adult incubating
1	Ferruginous Hawk	3/11/2019	Inactive	Empty	5/10/2019	Occupied Active		10-mile buffer	Unknown, adult incubating
6	Ferruginous Hawk	3/11/2019	Active	Incub. adult	5/10/2019	Occupied Active	Tree	10-mile buffer	Unknown, adult incubating
67	Ferruginous Hawk	3/11/2019	Not Detected		5/10/2019	Occupied Active	Tree	10-mile buffer	Unknown, adult incubating
5	Great Horned Owl	3/11/2019	Active	Empty	5/10/2019	Occupied Active	Tree	10-mile buffer	Unknown, adult incubating
33	Great Horned Owl	3/11/2019	Inactive	Empty	5/10/2019	Occupied Active	Cliff	10-mile buffer	2 chicks, 3 weeks old
36	Great Horned Owl	3/11/2019	Inactive	Empty	5/10/2019	Occupied Active	Tree	1-mile buffer	Unknown, adult incubating
59	Great Horned Owl	3/12/2019	Inactive	Empty	5/10/2019	Occupied Active	Tree	10-mile buffer	Unknown, adult incubating
9	Prairie Falcon	3/11/2019	Inactive	Empty	5/10/2019	Occupied Active	Cliff	10-mile buffer	Unknown, adult incubating
11	Red-tailed Hawk	3/11/2019	Inactive	Empty	5/10/2019	Occupied Active	11	10-mile buffer	Unknown, adult incubating
31	Red-tailed Hawk	3/11/2019	Inactive	Empty	5/10/2019	Occupied Active	Tree	10-mile buffer	Unknown, adult incubating
37	Red-tailed Hawk	3/11/2019	Inactive	Empty	5/10/2019	Occupied Active	Cliff	1-mile buffer	Unknown, adult incubating
69	Red-tailed Hawk	3/11/2019	Not Detected		5/10/2019	Occupied Active	Tree	1-mile buffer	Unknown, adult incubating

Table 2. Raptor Nests Detected During Nest Surveys for the Rail Tie Wind Project, Albany County, Wyoming.

Nest ID	Species	1st Visit	Status	Contents	2nd Visit	Status	Nest Substrate	Location	Contents
71	Red-tailed Hawk	3/11/2019	Not Detected		5/10/2019	Occupied Active	Tree	1-mile buffer	Unknown, adult incubating
45	Swainson's Hawk	3/11/2019	Inactive	Empty	5/10/2019	Occupied Inactive	Tree	45	Swainson's Hawk
7	Unknown - Large Stick Nest	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Cliff	10-mile buffer	Empty
8	Unknown - Large Stick Nest	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Cliff	10-mile buffer	Empty
12	Unknown - Large Stick Nest	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Rock	10-mile buffer	Empty
14	Unknown - Large Stick Nest	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Cliff	10-mile buffer	Empty
15	Unknown - Large Stick Nest	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Cliff	10-mile buffer	Empty
20	Unknown - Large Stick Nest	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	10-mile buffer	Empty
28	Unknown - Large Stick Nest	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Cliff	10-mile buffer	Empty
29	Unknown - Large Stick Nest	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Cliff	10-mile buffer	Empty
30	Unknown - Large Stick Nest	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Cliff	10-mile buffer	Empty
32	Unknown - Large Stick Nest	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Cliff	10-mile buffer	Empty
39	Unknown - Large Stick Nest	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Cliff	10-mile buffer	Empty
40	Unknown - Large Stick Nest	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Cliff	10-mile buffer	Empty
41	Unknown - Large Stick Nest	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	10-mile buffer	Empty

Table 2. Raptor Nests Detected During Nest Surveys for the Rail Tie Wind Project, Albany County, Wyoming.

Nest ID	Species	1st Visit	Status	Contents	2nd Visit	Status	Nest Substrate	Location	Contents
42	Unknown - Large Stick Nest	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Cliff	10-mile buffer	Empty
49	Unknown - Large Stick Nest	3/12/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Rock	10-mile buffer	Empty
50	Unknown - Large Stick Nest	3/12/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	10-mile buffer	Empty
53	Unknown - Large Stick Nest	3/12/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Cliff	10-mile buffer	Empty
54	Unknown - Large Stick Nest	3/12/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Cliff	10-mile buffer	Empty
61	Unknown - Large Stick Nest	3/12/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Cliff	10-mile buffer	Empty
65	Unknown - Large Stick Nest	3/12/2019	Not Detected		5/10/2019	Unknown Inactive	Cliff	10-mile buffer	Empty
66	Unknown - Large Stick Nest	3/12/2019	Not Detected		5/10/2019	Unknown Inactive	Cliff	10-mile buffer	Empty
3	Unknown - Raptor	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	10-mile buffer	Empty
4	Unknown - Raptor	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	10-mile buffer	Empty
13	Unknown - Raptor	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	10-mile buffer	Empty
16	Unknown - Raptor	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	10-mile buffer	Empty
17	Unknown - Raptor	3/11/2019	Inactive	Empty	5/10/2019	Unknown Inactive	Tree	1-mile buffer	N/A
18	Unknown - Raptor	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	1-mile buffer	Empty
19	Unknown - Raptor	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	Project Area	Empty

Table 2. Raptor Nests Detected During Nest Surveys for the Rail Tie Wind Project, Albany County, Wyoming.

Nest ID	Species	1st Visit	Status	Contents	2nd Visit	Status	Nest Substrate	Location	Contents
21	Unknown - Raptor	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	1-mile buffer	Empty
23	Unknown - Raptor	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	1-mile buffer	Empty
25	Unknown - Raptor	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	1-mile buffer	Empty
26	Unknown - Raptor	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	10-mile buffer	Empty
38	Unknown - Raptor	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	1-mile buffer	Empty
44	Unknown - Raptor	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	10-mile buffer	Empty
46	Unknown - Raptor	3/11/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	10-mile buffer	Empty
51	Unknown - Raptor	3/12/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	10-mile buffer	Empty
52	Unknown - Raptor	3/12/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Cliff	10-mile buffer	Empty
56	Unknown - Raptor	3/12/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	10-mile buffer	Empty
58	Unknown - Raptor	3/12/2019	Inactive	Empty	5/10/2019	Unoccupied Inactive	Tree	10-mile buffer	Empty
68	Unknown - Raptor	3/12/2019	Not Detected		5/10/2019	Unknown Inactive	Rock	1-mile buffer	Empty
70	Unknown - Raptor	3/12/2019	Not Detected		5/10/2019	Unknown Inactive	Tree	10-mile buffer	Empty

*Unknown Large Stick Nest is consistent with size and structure characteristics of an eagle nest, but could not be confirmed.

References

- Pagel, J.E., D.M. Whittington and G.T. Allen. 2010. Interim golden eagle inventory and monitoring protocols; and other recommendations. Division of Migratory Bird Management, U.S. Fish and Wildlife Service.
- Postupalsky, S. 1974. Raptor Reproductive Success: Some Problems with Methods, Criteria, and Terminology. In Management of Raptors, Raptor Research Report No. 2., edited by F.N. Hamerstrom, Jr., B.E. Harrell, and R.R., Olendorf, pp. 21-31. Vermillion, South Dakota: Raptor Research Foundation.
- US Fish and Wildlife Service (USFWS). 2013. Eagle Conservation Plan Guidance: Module 1 - Land-Based Wind Energy, Version 2. US Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. Executive Summary and frontmatter + 103 pp. Available online at:
<https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf>

Appendix A – Eagle nest photo log



Nest 2. Occupied-active bald eagle nest.



Nest 10. Occupied-active golden eagle nest.



Nest 24. Occupied-inactive golden eagle nest.



Nest 27. Occupied-inactive golden eagle nest.



Nest 34. Occupied-active golden eagle nest.



Nest 35. Occupied-inactive golden eagle nest.



Nest 43. Occupied-active golden eagle nest.



Nest 48. Occupied-inactive golden eagle nest.



Nest 55. Occupied-active golden eagle nest.



Nest 57. Occupied-active golden eagle nest.



Nest 60. Occupied-active golden eagle nest.



Nest 62. Occupied-inactive golden eagle nest.



Nest 63. Occupied-active golden eagle nest.